REMARKS

Claims 1-3, 8-23, and 28-33 remain in the application.

The Examiner has renumbered the claims added in the last amendment. Applicants' attorney apologizes for this inadvertent error. The corrected number appears in the amended claims above.

The Examiner has rejected Claims 1-3, 8-23, and 28-30 under 35 U.S.C. §103(a) as being obvious over J. Linke et al. (presumably "Behaviour of boron doped graphites ... ," hereafter Linke) in view of Kramer et al. (U.S. Patent 5,271,967, hereafter Kramer) and Srihari Ponnekanti et al. (presumably "Failure mechanisms of anodized aluminum ... , " hereafter Ponnekanti). This rejection is traversed.

The Examiner interprets Linke as disclosing "coating an aluminum-based member ('stainless steel'; fourth paragraph) of substantially pure aluminum with boron carbide. The Examiner's reading is incorrect. Linke admittedly discloses coating stainless steel with boron carbide. However, stainless steel is not aluminum-based and certainly is not substantially pure aluminum. A commonly used definition is that stainless steel is an "alloy steel practically immune to rusting and ordinary corrosion, having chromium as its essential alloying constituent." (*Webster's New Collegiate Dictionary*, 1961). A steel is a "commercial form of iron containing carbon in any amount up to about 1.7 per cent ... ." (*ibid.)* It may be possible for a stainless steel such as Linke's to contain a small fraction of aluminum but stainless steel, as that term is commonly used in the art, is not aluminum based (Claims 1 and 13), and certainly does not conform to the 90 wt% aluminum content recited in Claim 1. It is not seen how it is possible to anodize Linke's stainless steel since, as stated in its definition, stainless steel is practically immune to ordinary rusting and corrosion. Anodization as used in the present application and by Ponnekanti is an electrochemical conversion of the surface of an aluminum-based material to a porous aluminum oxide layer, a process very similar to rusting. Stainless steels are commonly characterized by their resistance to surface oxidation, that is, rusting.

As a result Linke's stainless steel substrate (as well as other high-temperature substrates he is considering for the extreme temperatures of a Tokamak reactor) are fundamentally different from the low-temperature aluminum substrates of either Ponnekanti or Kramer. Linke's boron carbide coating is taught to reduce erosion in the high-temperature plasma of a Tokamak reactor. On the other hand, Ponnekanti's anodization is taught to provide a barrier layer for the base aluminum base alloy in the harsh halide-enriched plasma environment in chemical vapor deposition reactors. In particular, the aluminum would otherwise be converted to AlF_3, which is known to cause particle problems in the fabrication of integrated circuit. It is further noted that plasma chemical vapor deposition is a low-temperature process. Ponnekanti mentions 150°C in contrast to the 1400°C of Linke's Tokamak reactor. There is no suggestion in the art that the high-temperature protective layer of Linke is advantageous or needed in the low-temperature reactor of Ponnekanti. Kramer is relevant for roughening aluminum prior to plasma spraying, but he mentions neither anodized aluminum nor boron carbide. Further, Kramer is concerned with wear surfaces in automobile engines, not with the various plasmas of Linke and Ponnekanti. Accordingly, combining Kramer with the plasma art requires more motivation than that provided by the Examiner.

Both base claims require depositing a boron carbide layer on an anodized layer formed in an aluminum-based substrate. Only Ponnekanti describes an anodization layer. The Examiner nonetheless attempts to motivate coating Linke's boron carbide layer over Ponnekanti's anodization layer as abating erosion behavior in a plasma environment. But Ponnekanti does not suggest that his CVD reactor is subject to an erosion problem, as that term is used by Linke in his Tokamak reactor operating at extreme temperatures and particle energies. Ponnekanti is instead concerned with point defects and cracks being generated in the anodization layer, possibly from fluorine radicals in the plasma. Neither Linke nor Ponnekanti suggest that Linke's boron carbide layer would stop the failure mechanisms noted by Ponnekanti. The only suggested solution by Ponnekanti is to use plate rather than bar stock for the aluminum. Further, the art is silent on using a second (boron carbide) barrier to protect a first (anodized) barrier layer. If Ponnekanti's

protective anodization layer fails, why keep it when applying a protective boron carbide layer. The Examiner has obtained such a complex structure of a boron carbide coating over aluminum, possibly roughened, from disparate art only by the use of unpermitted hindsight.

Claims 16 and 28 require that the anodization layer be formed at least partially in a roughened surface. The only reference for roughening (Kramer) roughens the surface immediately before thermal spraying of his protective layer. Therefore, Kramer, in so far as the reference is relevant, would teach roughening after anodization, rather than before anodization as claimed.

Claim 17 requires removing the anodization from a second portion. The Examiner apparently is relying upon the crack of Ponnekanti's anodization layer, which may extend down to the aluminum substrate, for the removal of anodization. The Examiner's interpretation of stress-produced cracks as amounting to removing material is objected to as not conforming to the normal interpretation of claim language by the ordinary mechanic in the art. However, to make the point clearer, Claim 17 has been amended to required that the first and second portions be separated by a predetermined boundary, as illustrated in FIG. 5 and as determined by the grit blasting described on page 13, lines 14-16. Unintentional and deleterious cracks, of the sort described by Ponnekanti, do not have predetermined boundaries. There is no suggestion in the art for removing anodization and thereafter anodizing. Claim 30, particularly as amended, requires that boron carbide be deposited onto the substrate surface from which the anodization is removed. It is very much doubted that Linke's thermal spraying would penetrate Ponnekanti's very narrow cracks to reach the aluminum substrate.

A new dependent Claim 31 has been added to recite the anodization removal and partial coating as illustrated in FIG. 5 and described on page 13. A further dependent Claim 32 recites the partial roughening described on page 14. These two claims cover somewhat similar restrictions as found in Claims 16 and 17 and the restrictions are introduced in different order. A new dependent Claim 33 requires that the boron carbide layer be deposited over an unroughened portion of the aluminum substrate, contrary to Kramer's teaching of roughening for adhesion of a

deposited protective layer.

A central problem with the rejection is the combination of protective coatings for two entirely different sorts of plasma environments. It is difficult to find motivation for combining references when the environments and failure mechanisms differ so significantly. Simply because both Linke and Ponnekanti involve plasmas does not provide the necessary motivation of combining references involving different operating conditions, different substrates, and different failure mechanism, and different protective layers. Some more specific suggestion must be pointed out.

In view of the above amendments and remarks, reconsideration and allowance of all claims are respectfully requested. If the Examiner believes that a telephone interview would be helpful, he is invited to contact the undersigned attorney at the listed telephone number, which is on California time.

Respectfully submitted,

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Version with markings to show changes made

Please replace the claims with:

17. (Twice Amended) The method of Claim 16, further comprising removing said anodization layer from a second portion of said substrate adjacent to said first portion and separated therefrom by a predetermined boundary, said roughened first portion extending below a portion of said anodization left by said removing step.

28. [24.] (Amended) The structure of Claim 1, wherein said roughening step is performed before said anodizing step.

29. [25.] (Amended) The structure of Claim 1, further comprising removing said anodization layer from only a first portion and not from a second portion of said surface of said substrate, wherein said boron carbide layer is deposited on both said first and second portions after said removing step.

30. [26.] (Amended) The process of Claim 17, wherein said boron carbide layer is deposited onto [over] said anodized first portion and second portion [portions] of said substrate.

31. (New) The process of Claim 13, further comprising the step performed between said anodizing and depositing steps of removing said anodization layer from a first portion of said substrate separated by a predetermined boundary from a second portion of said substrate from which said anodization layer is not removed, and

wherein said depositing step deposits said boron carbide layer in a layer extending over said first portion of said substrate and across said boundary to a neighboring part of said second portion of said substrate.

32. (New) The process of Claim 13, further comprising the step performed prior to said anodizing step of roughening a third portion of said substrate including a part of said first portion of said substrate and extending across said boundary to said neighboring part of said second portion of said substrate.

33. (New) The process of Claim 32, wherein a further part of said first portion of said substrate is not roughened and wherein said depositing step deposits said boron carbide layer over said further part.